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13. ABSTRACT *(Maximum 200 Words)*

The Student Hands-On Training (SHOT) I & II workshops will provide students beginning the AFRL's University Nanosat 3 program with basic space hardware hands-on and in-flight training. The objective of SHOT I&II workshops are to provide these new students exposure to some of the basics of spacecraft construction, the teamwork and coordination involved, as well as the challenges with integration, test and launch of a satellite. Each workshop was completed in three days. Participants traveled to Boulder, Colorado, to receive their hands-on training. Day three was devoted to launch, recovery, and data analysis of their BalloonSat or experiment. During the SHOT I workshop student teams constructed a simple 500 gram satellite called a BalloonSat and launched it to 30 km. The SHOT I workshop training was geared for the novice experimenter but provided a complete program from requirements, design, build, test, launch and analysis. During the SHOT II workshop students brought their own BalloonSats which contained experiments and prototypes that will support their team's University Nanosat 3 mission.

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1 OBJECTIVES

The primary objective of this program was to help prepare the student participants in the University Nanosat 3 program through the hands-on research activities of this workshop. Students were organized into teams of four people from the same home institution. Each team was given specific requirements and a schedule. During the SHOT I workshop, they were given all the materials needed to create and build a BalloonSat. During the SHOT II workshop, student teams brought their own working BalloonSat to demonstrate concepts of their teams University Nanosat 3 mission. Both workshops provided accommodations for each student as well as breakfast and lunch for all three days. Transportation to the launch site, the recovery site, and back to the university was also included.

Each student participating in the three day program was given a handbook and a CD-ROM with all of the information presented during the workshop as well as documents that were referred to in the workshop. During the SHOT I workshop, most of the materials used for the construction of each team's BalloonSat was given to the teams at the end of the workshop and was distributed per each team's discretion. Some support hardware was required for both workshops. This hardware was needed to provide three mobile tracking and recovery stations for students to track the progress of their BalloonSat in realtime during SHOT I. Three additional tracking stations were added for SHOT II for a total of six. All launch costs were covered as part of the workshop.

2 STATUS OF SHOT WORKSHOPS

Both SHOT workshops were a success! The SHOT I workshop took place at the University of Colorado at Boulder campus July 10 – 12, 2003. Forty-eight students, from the University Nanosatellite Program, participated in the workshop. All teams completed their BalloonSats and were launched and recovered. The SHOT II workshop took place at the same place as SHOT I on June 4 – 6, 2004. Ten of the University Nanosat teams participated in SHOT II. Each team followed a set of requirements and presented their compliance in a formal review during the workshop. The document that contains these requirements has been attached to this report.

3 ACCOMPLISHMENTS/NEW FINDINGS

The SHOT I workshop achieved all the goals set forth by the proposal. The students that participated learned the basic skills involved in designing and integrating simple systems for launch. Many teams had an excellent experience with the team. Teams were strengthened by this experience. Many of the BalloonSats received good engineering data along with excellent imagery.

The SHOT II workshop produced some excellent data for the students to use in the completion of the University Nanosat 3 missions. Many schools flew similar hardware and experiments that will be flown on the University Nanosat 3 mission.

4 PERSONNEL SUPPORTED

List professional personnel (Faculty, Post-Docs, Graduate Students, etc.) supported by and/or associated with the research effort.

Chris Koehler	CSGC	PI, Staff, Deputy Dir.
Bernadette Garcia	CSGC	Staff, Program Coordinator
Steve Wichman	CSGC	Staff, Software Engineer
Dave Beckwith	CSGC	Staff, Electronics Engineer
Ashleigh Bailey	CSGC	Student
Hwapyong Ko	CSGC	Student
Anna Proctor	CSGC	Student
Jeff Ganley	AFRL/SVD	
George Hunyadi	AFRL/SVD	
Mike Manes	EOSS	

5 PUBLICATIONS

No official publications were made. There was a post-workshop CD-ROM made for participants from the SHOT I workshop. Copies are available upon request.

6 INTERACTIONS AND TRANSITIONS

6.1 Participation and Presentations at Meetings, Conferences, and Seminars

The SHOT I workshop consisted of meetings on July 10 and July 11, 2003. A final meeting was held on July 12, 2003 to report on individual team results. The SHOT II workshop consisted of meetings on June 4 and June 6, 2004. All meetings convened in Boulder, Colorado. Details of meetings can be found on the following website. spacegrant.colorado.edu/SHOT

6.2 Consultative and Advisory Functions

The PI worked with members from AFRL prior to the workshops for planning purposes of the SHOT workshops. All interactions were limited in this way.

6.3 Transitions

Students involved with the SHOT I and SHOT II workshops are using their skills on their University Nanosat 3 missions.

7 NEW DISCOVERIES

None. .

8 HONORS AND AWARDS

Colorado Space Grant at the University of Colorado will be highlighted in a special on the Discovery Channel. The Discovery Channel is doing a series on Universities and Colleges in the country. The University of Colorado was chosen as one of the Universities. The Discovery Channel team decided to look at three topics of interest at CU and Space Grant was chosen because of the high numbers of undergraduate participation in three satellite projects which include Three Corner Sat from the Nanosat 2 program and DINO from the Nanosat 3 program.